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## 1 Abstract

This study aims to explore the preference of different coffee-alternatives by consumers and correlate it with the result of a sensory profile from a trained panel. The result is a significant preference of lupin coffee over spelt coffee, with different lupin coffees also being liked to different degrees. Overall, the lupin coffees from the organic farm Kelly are liked the most.

## 2 Introduction

The trend towards sustainable protein sources is growing enormously. Lupins, as legumes, are such regional, sustainable protein sources. They can be used to make numerous products, including coffee, that can meet consumers' needs for sustainability. In this study, a sensory profile of three lupin coffees and one spelt coffee is created. In addition, a consumer test is conducted.

The aim is to analyse the preference of different coffee-alternatives by consumers. The results of the consumer questionnaire will be correlated with the sensory profile of a professional panel.

## 3 Material and Methods

In this study, the following 4 coffee samples are examined:

- Spelt coffee, Alnatura
- Lupin coffee concentrate, organic farm Kelly
- Lupin coffee, organic farm Klein
- Lupin coffee, organic farm Kelly

Trough a **descriptive test according to DIN EN ISO 13299** a qualitative, descriptive profile (QDA) is created. Therefore, specially trained panelists (n=8) performed a repeated measurement. Intensity is measured on an unstructured linear scale (10 cm). Random three-digit sample codes are used and the samples are presented randomized to avoid drawing conclusions. The data are analysed for significant differences utilizing ANOVA. A significance level of  $\alpha = 0,05$  is used.

A **hedonic test according to DIN EN ISO 11136** is carried out to inquire consumers preference. In the consumers survey a ranking of the coffees, the preference, the liking of the handling and suggestions for improvement of the lupine coffee concentrate are asked. Consumers (n=54) are interviewed on the weekly market and the University in Sigmaringen. For the evaluation, the obtained data are combined with them data form the QDA and visualised with the help of a preference map.

## 4 Results

The results from the QDA are shown in diagram 1. The attributes brown, turbidity, smoky, sweet and roasted (taste) show significant differences between the individual samples. The significance of the attribute smoky depends mainly on the spelt coffee.

Compared with the consumers ranking (see diagram 2 and 3), the spelt coffee is most frequent on the 4<sup>th</sup> place, which shows that the smoky odor is not preferred.

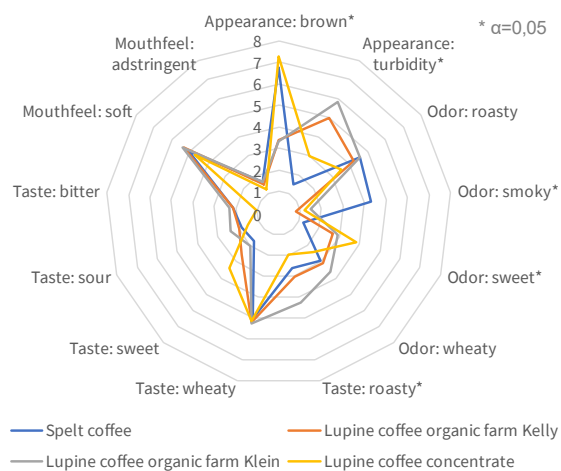


Diagram 1: Results sensory profile

This is confirmed by the biplot (diagram 4). In contrast, the lupin concentrate was chosen most often at the 1<sup>st</sup> rank, even if only half of the respondents knew lupin as a plant and 64 % were not previously aware of any food made from lupin.

Consumers	Female	Male	Age [years]	<30	30-40	40-50	>50
n	37	17	n	21	8	3	22

Table 1: Demographic data of the consumers

## 6 Conclusion

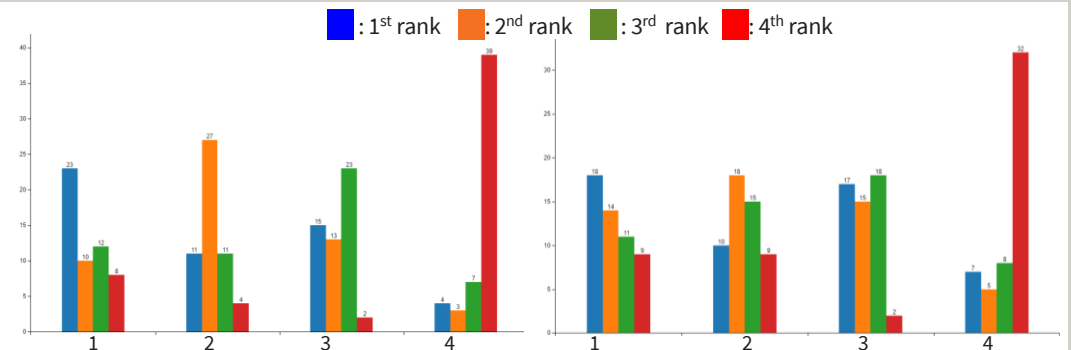
Overall, it is easy to see that consumers prefer a coffee that is turbid and not smoky, but sweet-smelling. The lupin coffees fulfil this mostly.

The Klein lupin coffee is the least favoured of the lupin coffees whereas the lupin coffee concentrate is preferred over the other samples.

However, it was difficult for consumers to break away from the expectation of bean coffee and embrace this new type of coffee.

## 7 Outlook

Nevertheless, the lupin coffee concentrate has potential in the market. The next step is to develop and distribute a prototype. It became clear from the survey that discounters and supermarkets should be chosen as the marketing focus, as the consumers in the survey mainly buy their coffee here. In addition, the consumer survey showed that other varieties, such as a mild, an intense and a lupin coffee with caffeine, are in demand.



1: Lupin coffee concentrate Kelly, 2: Lupine coffee organic farm Klein, 3: Lupin coffee organic farm Kelly, 4: Spelt coffee  
Diagram 2: Ranking Odor

The preference maps (diagram 5, 6) clearly show that lupin coffee is preferred to spelt coffee. The individual differences between the lupin coffees also become clear. Kelly's lupin coffee is most preferred by smell with 60-80 %, but the lupin coffee concentrate also achieves a high liking by smell with 40-60 %. All in all, the smell of lupin coffee is preferred more than the taste. This was also reflected in the consumers' improvement suggestions, who frequently mentioned the basic taste.

Diagram 3: Ranking Taste

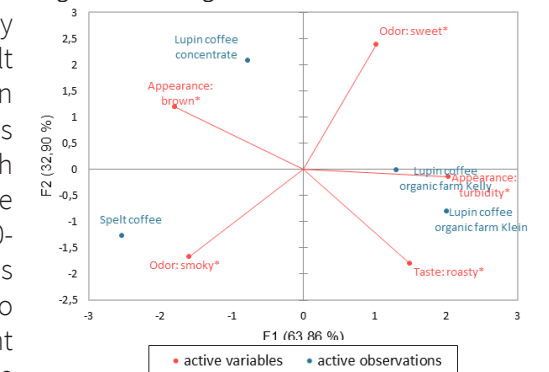


Diagram 4: Biplot (96,76 %) with significant attributes

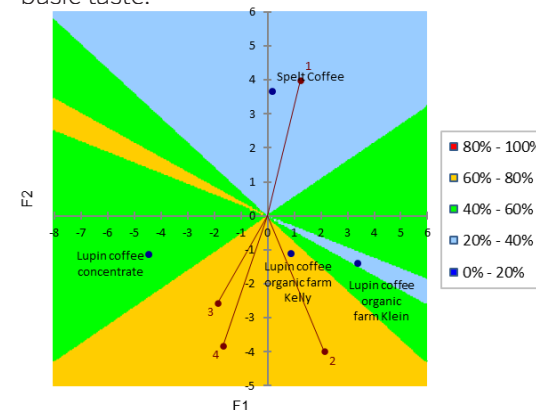


Diagram 5: Preference Map Odor

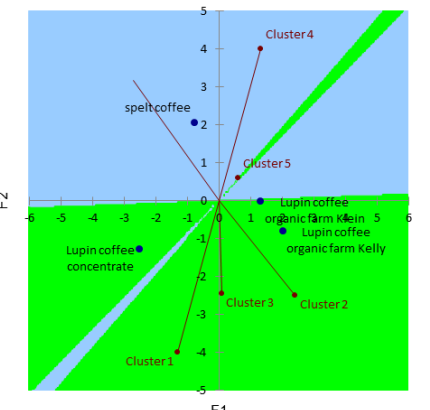


Diagram 6: Preference Map Taste

The handling of lupin coffee concentrate is generally well received by 60 % of the consumers. Nevertheless, 15 % of consumers find it too far removed from the classic ritual of bean-to-cup coffee. The simple dosing options, such as a dosing attachment, a lid as a measure or even just a spoon are the most popular.

## 5 Discussion

The lupine coffee concentrate is preferred, as it is perceived most similar to bean coffee, aromatic, intense and caramel-like, both in smell and taste. This is confirmed by the panel, here the concentrate is described as the sweetest in smell and taste. The reference for the sweet smell was caramel syrup, which is perceived as such by consumers.

Due to the name "coffee", consumers already have the expectations of a classic bean coffee. The comparison of the lupine coffees with this known taste is not desired since lupin coffee has different sensory properties.

The evaluation of the panel results showed very high standard deviations, especially for the attributes soft (mouthfeel) and wheaty (taste). Due to this high dispersion, all samples have similar mean values for these two attributes, which is why an evaluation for significant differences is not meaningful. Especially for these attributes the panel should have been trained further.

In the consumer survey, there were problems in understanding some of the questions. These could not be included in the evaluation. In addition, only 20 % of the consumers surveyed were in the age group between 30 and 50 years.

## References

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